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ABSTRACT

To obtain an overview of research in agricultural education since 1966, approximately 500 studies were reviewed under these topics: (1) Philosophy and Objectives, (2) Manpower Needs and Employment Opportunities, (3) Teacher Education, (4) Learning Processes and Teaching Methods, (5) Instructional Materials and Devices, (6) Curriculum Development, (7) Administration and Supervision, (8) Educational Programs, (9) Facilities and Equipment, (10) Student Personnel Services, and (11) Evaluation. Some conclusions and recommendations include: (1) The Level of sophistication in research is improving, (2) More research is being conducted by professionals, despite the fact that a majority of the research is undertaken by graduate students, (3) There has been a shift from production agriculture to programs of off-farm agricultural occupations, (4) Means for increasing the impact of vocational guidance services upon students is needed, (5) Trends in off-farm occupations need clarification so that courses and guidance information can be provided, and (6) A new philosophical basis for agricultural education, based on sound research techniques, should be developed. The earlier "Review and Synthesis," covering research prior to 1966, is available as ED 011 562. (SB)

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*second edition*

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# REVIEW AND SYNTHESIS OF RESEARCH IN AGRICULTURAL EDUCATION

**Second Edition**

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## PREFACE

This *Review and Synthesis of Research in Agricultural Education, Second Edition,* is one of a series of "state of the art" papers in vocational and technical education and related fields. It should assist in identifying substantive problems and methodological approaches for researchers and curriculum development specialists, as well as providing practitioners with a summary of research findings which have application to educational programs. In the field of vocational and technical education, the pace of research and development activities has increased considerably during the period under review. Gaps which exist for the reader are probably the result of the authors' prerogative to be selective.

As one of a series of information analysis papers released by the ERIC Clearinghouse on Vocational and Technical Education, this review is intended to provide researchers, curriculum development specialists, and practitioners with an authoritative analysis of the literature in the field. Those who wish to examine primary sources of information should utilize the bibliography. Where ERIC Document numbers and ERIC Document Reproduction Service prices are cited, the documents are available in microfiche or hard copy forms.

The profession is indebted to Earl T. Carpenter and John H. Rodgers for their scholarship in the preparation of this report. Recognition is also due William E. Drake, Professor of Agricultural Education, Cornell University, and Richard A. Baker, Director of the Occupational Research Coordinating Unit, Auburn University, for their critical review of the manuscript prior to its final revision and publication. Joel H. Magisos, information specialist at The Center, coordinated the publication's development.

Members of the profession are invited to offer suggestions for the improvement of the review and synthesis series and to suggest specific topics or problems for future reviews.

Robert E. Taylor
Director
The Center for Vocational and
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and Technical Education

## INTRODUCTION

The intent of the authors of this review and synthesis of research was to prepare a document of value to teachers, school administrators, supervisory personnel and teacher educators as well as researchers. The volume of research involved prohibited extensive reporting on individual studies. Also, the individual citations had to be limited. However, the review of studies prompted author observations and comments pertaining to research efforts, weaknesses and possibilities for impacting on programs.

The extensive volume of research examined is indicative of the growth occurring in R and D activity in education. More than 1000 manuscripts released since the first *Review and Synthesis* were considered in preparing this edition. Approximately 500 having a direct influence on this report are included in the bibliography.

In preparing this work, emphasis has been placed on generalizations based on consistent findings from the studies. Certain studies have been reported in some detail because they were particularly significant or unique and in other instances because they reflected a typical approach or results.

A major purpose of this work was to serve as a convenient source for obtaining an overview of research reported during the past three years in agricultural education. Those interested in categories of research reported herein will also find the bibliography of great help in identifying studies pertinent to their particular problems or areas of interest.

Earl T. Carpenter
John H. Rodgers

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# REVIEW AND SYNTHESIS OF RESEARCH IN AGRICULTURAL EDUCATION

**Second Edition**

## PHILOSOPHY AND OBJECTIVES

Proficiency in farming was the time-honored goal for agricultural education from the time of its inception. Soon after World War II it became evident that a broader objective was needed, one that encompassed certain off-farm aspects of agriculture. It seemed a logical transition from "proficiency in farming" to "proficiency in agricultural occupations," including farming, as the controlling purpose of agricultural education. And, the Vocational Education Acts of 1963 and 1968 legalized the change.

But, W. Howard Martin (1969) said that isn't good enough. In his address to the American Association of Teacher Educators in Agriculture at Boston he said, ". . . much of what has gone on . . . since 1963 has failed to tune me in. It is too job oriented—too centered on needs of industry and too programmed by Big Brother."

Recognizing the need of youth to commit themselves to something which gives more accent to life, Martin suggests a new all-inclusive term must be found, a term broad enough to provide emphasis in: (1) agricultural production and marketing, (2) natural resource management, (3) environmental development, and (4) agricultural research and service. He recommended a commission on agricultural education be formed to deal with this matter. Steps were taken at the meeting to establish such a commission.

Job-specific vs. broader-based occupational education geared to individual needs and interests of students is the most critical issue concerning vocational education in recent times. The issue is especially crucial in agricultural education. In this program, as it has operated in the past, students having a variety of occupational objectives have been grouped into the same classes where they learned knowledge and skills needed in the broad field of agriculture as well as leadership and human relations skills useful in most occupations. More recently there has been a tendency to offer basic courses in principles of plant and animal sciences in the ninth and tenth grades with more specialized offerings such as horticulture and agricultural mechanics in later years. As they are usually taught, the advanced courses emphasize individual needs of students with course content applicable to a relatively broad range of occupations. Much has been written by agricultural educators about the need for providing students with a basis for upward mobility beyond their entry occupations in agriculture.

This issue of job-specific vs. student-centered occupational education becomes particularly serious when program objectives, program evaluation and, ultimately, the allocation of funds to vocational programs are considered. If programs are to be evaluated largely on the basis of the number accepting entry-level employment and staying on that job, it seems obvious that job-specific educational programs will fare better. As noted above, programs in agricultural education have tended to be broad based. With

proponents of job-specific occupational education generally controlling programs at the Federal level, agricultural educators may well be forced to decide between programs in keeping with their philosophy and programs that can be readily funded.

Research to date has produced little in the form of solutions to such vital issues. Perhaps these problems do not lend themselves readily to attack by the research method. To know whether former students of highly job-oriented education programs fared significantly better, or worse, than other students could be of great value to the U.S. economy. Also, it would be of value to know in what ways the issue may be affected by varying characteristics of students and of jobs. Certainly the job-specific orientation currently in vogue is not supported by research on career development.

For many years investigators have been attempting to resolve lesser issues relative to programs of agricultural education. Such work has often included comparisons of the opinions of various groups relative to the issues. These studies have resulted in important program improvements by bringing differences out in the open.

Herndon (1966) surveyed key people (school board presidents, school administrators, and parents) in the State of New York to determine their opinions concerning certain aspects of the school program in vocational agriculture. It is evident from his findings that those key people would not favor a shift to job-specific education geared primarily toward entry employment. Based on his survey he concluded that the high school program in vocational agriculture should: "(1) benefit both terminal students and students who plan further training in agriculture, (2) provide good general education, (3) be beneficial to students with agricultural vocations other than farming, (4) provide the knowledge, skills, and experience needed by those students who plan to enter farming, (5) offer supervised farming programs, (6) offer a broad course content based on the many types of farming in the area, and (7) not be restricted to the last two years of high school."

The Future Farmers of America (FFA) has been an effective organization in the general educational development of large numbers of agriculture students since its inception in 1928. Studies have repeatedly shown that the students, school administrators and the public in general have favored opportunities provided by this organization for youth development. Morton (1968) studying opinions of school administrators in Oklahoma substantiated earlier findings. The administrators generally approved methods being used in conducting FFA activities. Roys (1966) found evidence that the FFA does effectively develop leadership skills superior to those found in a control group.

The program of vocational agriculture has been based predominantly in public secondary schools although there is a recent increase in programs at post-secondary institutions. In addition many teachers in most states conduct out-of-school programs for young and adult farmers and other agricultural workers. Research has shown repeatedly that school administrators consider the in-school program to deserve higher priority than adult work. And frequently, teachers of vocational agriculture have found conflict be-

tween their own view of their job and the view held by school administrators. The controversy often comes to light when considering priorities between work at nonagricultural duties at the school and work with out-of-school agricultural clientele. Too, agricultural teachers have generally given higher priority than school administrators to supervision of agricultural experience activity done off campus by in-school students.

This issue is an old one and readily explained when it is recognized that school administrators generally believe their major responsibility is to elementary and secondary school students whereas vocational teachers have been taught to meet occupational education needs of people of all ages. Evidence of this difficulty has been uncovered repeatedly by researchers down through the years. In more recent work at North Carolina State University (O'Quinn and Scarborough 1968), comparisons were made between the perceptions held by administrators and agriculture teachers of the proper role of the teacher of vocational agriculture. They found that teachers considered their role as teachers of adults to be significantly more important than did administrators. Also, administrators considered the teacher's role as a member of the faculty to be significantly more important than did teachers. This work and similar work by Forrest (1968) at the same institution indicates that a high degree of agreement exists between administrators and teachers on the appropriate roles of teachers of vocational agriculture.

Program outcomes and program development are directly related to philosophy held by personnel and objectives formulated for program operation. Hence, it seems wise that administrators refrain from ignoring research findings when formulating objectives. Also, it would seem important to revert to the mode of developing philosophy through meditation, consideration of facts, weighing advice and counsel from industry and many other sources, rather than fostering an imported philosophy from outside the profession.

The foregoing emphasizes the need for much new research activity to help resolve important philosophical questions. The issue of job-specific vs. student-centered approaches to agricultural education is clearly linked to program objectives. Available evidence seems to indicate program objectives should give greater consideration to preparation for upward mobility after former students have accepted employment. How these important issues are resolved will be paramount in determining the roles of the various professionals in agricultural education as well as the effectiveness of the program.

## MANPOWER NEEDS AND EMPLOYMENT OPPORTUNITIES

### Farming Occupations

Heady and others (1968) at Iowa State University have developed a mathematical programming model for specification of major agricultural products of 144 regions of agriculture in the nation. Using this model and other appropriate analysis techniques they made estimates of agricultural

production and manpower requirements to 1980. The complexity of the analysis is indicated by the fact that more than 800 equations and 2,200 variables have been used to program projections of the agricultural structure into the future; consideration is being given to extending the model to include as many as 4,000 equations and 35,000 variables.

In the preliminary report reviewed for this writing, data for the 144 regions were aggregated into the areas of the 10 farm production regions of the Department of Agriculture. According to the projections there will be important shifts in production among the 10 regions. For example, soybean production, to increase 24.7 percent in the United States for the 1965-1980 period, is shown to increase 20.4 percent in the Northeast while declining 26.4 percent in the Delta region. Feed grains are expected to decline 9.9 percent for the nation with the Delta region declining 69.2 percent while the Lake States, Appalachian and Southeast regions are expected to show increases of four to six percent. The amount of idle farmland is to decline by 18.6 percent with substantial decreases in the Northeast and Pacific regions while the Delta region is expected to have a large increase in idle acres.

Using similar analysis techniques they are predicting further substitution of capital for labor in farming. For the United States capital requirements for farm production are expected to increase by 38.5 percent from 1965 to 1980. Man hours of labor are to decline by 31.9 percent with the extent of decline ranging from 18.2 percent in the Pacific region to 40.6 percent in the Delta region. Farm size is to increase from a United States average of 337 acres in 1965 to 574 acres by 1980 resulting in a decrease from 3.37 million to 1.98 million farms for the period. Considerable variation among the regions is expected.

To project the number of farm workers, trends in farm employment were considered in the equations, and the number of hired and family laborers have been projected separately. For the nation, the total farm work force is expected to decline by 35.9 percent from 5.6 million in 1965 to 3.6 million in 1980. Thus, a total out-migration of 2 million farm workers has been projected to take place between 1965 and 1980. The data indicate that the approximate 1:3 ratio between hired and family labor will prevail throughout the period.

This study is being directed by an imminent agricultural economist who has employed modern analytical procedures to the available data related to the technological revolution in agriculture in an effort to establish realistic projections of the nature and extent of agricultural adjustment to 1980. The method is the most sophisticated and comprehensive to date; so it seems reasonable to consider the results to be the best available at this time for program planning and vocational guidance purposes.

The final report is expected to give detailed projections of changes cited above for the 144 regions of the United States. In addition, if the original objectives for the study are achieved, the final report will contribute to a determination of the types and amounts of vocational-technical education required for the future structure of agriculture, both on and off the farm.

*Statewide Studies.* There is continued interest in farming opportunities which may become available to young men who have studied vocational agriculture. Studies of farming opportunities have centered on local communities to a great extent, and this seems appropriate considering the abundance of research data indicating that those who farm tend to do so within 25 miles of where they were reared. A few studies of expected opportunities for an area as large as a state have been reported.

Earlier studies, generally in the late 1950's, approached farming opportunities from the replacement-ratio point of view. Farm population data from the Census were generally treated with a formula to account for migration, death and retirement of farm operators, and a ratio of replacements required for each 100 farm operators was obtained. In most studies of this type ratios were derived for each county and data were often summarized for the state.

A weakness of the replacement-ratio studies was apparent in that they failed to take into account the reduction in number of farms which has been a consistent trend since the 1930's. Several studies by workers in agricultural economics and agricultural education in the late 1950's were directed toward more realistic projections of farming opportunities considering both the changing number of farms and expected vacancies in farm operatorships.

Work of Carpenter (1960) Missouri typifies this approach. In this study, trends were projected to 1975 concerning acreage to be available for farming, farm size and adequate-income farms as a percent of all commercial farms. Opportunities to become available were derived from the age distribution of farm operators and from death rates. Migration of farm operators was not accounted for because of the absence of data relative to the transfer of farm operators to and from other types of employment. Using these trends, the projected number of entry opportunities was ascertained for each five-year period from 1960 to 1975. These entry opportunities were then compared with the number of rural-farm males entering working age for each period and with the number of seniors studying vocational agriculture. The projections were made by 11 economic areas and summarized for the state. Perhaps the most significant finding was the extreme variation from one area to another which indicates the need for studying entry opportunities into farming on a local basis.

Workers in the Department of Agricultural Education at Iowa State University developed a simplified version of the approach used in Missouri for determining the number of replacement opportunities needed in each county. In the Iowa work the recent trend in declining farm numbers as taken from the Census was projected forward for five years and divided by five to establish an annual loss because of farm consolidation. Then, one-half the number of farm operators 55-64 years of age plus all farmers 65 and over were assumed to die or retire within 10 years. Out-migration was assumed to equal 1.5 percent of all farm operators under 55 years of age.

The number of replacement farmers needed was then determined by adding the number to die or retire and migrate and subtracting the expected decrease in number of farms.

Genereaux (1967) used this procedure in Nebraska to determine a need of 957 replacements for farm operators annually. There was a wide variation among counties.

*Local Studies.* Rawson (1967) in Pennsylvania used the Iowa formula mentioned above to predict entry opportunities in farming in Centre County. The county contained 1,035 farms according to the 1964 Census and by applying the formula a total of 10.55 replacements would be required annually. However, interviews with randomly selected farmers indicated as many as 18 farm operators may have entered farming in 1964 in addition to 12 full-time hired workers. It is not certain whether the formula actually underestimated replacement needs or whether the randomly-selected sample of farms was not representative of all farms in the county.

Harless (1966) in Iowa reported a study of farming opportunities in a local school district (NESCO Community in Story County). After personally interviewing each of the 188 farmers in the community he determined that an average of five farmers anticipated becoming inactive in farming each year between 1965 and 1989. This compares favorably with the 4.3 replacements that would be required based on the Iowa formula. However, he estimated two percent rather than 1.5 percent (as previously used) of all operators less than 55 years of age would migrate out of farming annually.

The foregoing is indicative of the interest in studying farming opportunities. Considerable progress has occurred since the replacement-ratio studies of a decade ago. More recent studies have given consideration to farm consolidation and other trends in modern agriculture. Investigators have attracted attention to the high degree of variation from one locality to another. A questionable assumption seems inherent in most of these studies, however, and that is the implication that entry opportunities will become available to high school graduates of vocational agriculture. It is probably more realistic to assume that entry opportunities will be taken up by persons of diverse ages and circumstances. The old concept of an agricultural ladder—hired hand, renter, owner operator—may never have been descriptive for large numbers who have become farm operators. And today, the occupational histories of many farm operators include careers in military service and in business and industry.

This seems to suggest that tabulations of actual changes in farm entrepreneurships in local communities conducted by teachers of agriculture with the assistance of their classes and other interested agricultural workers may be a most desirable approach. It would be interesting and useful for teachers and students to know exactly what happens with regard to changes in land ownership and entrepreneurship, the occupational history of new farm operators, changes in the hired farm work force in the community and how former students of vocational agriculture are progressing toward establishment in farming. Such a project would not only reveal the quanti-

tive extent of entry opportunities into farming, but since it is concerned with the local situation it would permit a qualitative evaluation of the opportunities as well.

The evidence is conclusive that farming opportunities are becoming fewer and of higher quality. The capacity to acquire an opportunity is probably the result of many factors among which the amount of vocational education in agriculture is not too important. This indicates that if vocational agriculture is to serve most future farmers, it is essential that the program should be offered in most rural communities. And, since many who study vocational agriculture will not farm, courses in these communities should emphasize preparation for a broad range of agricultural jobs and for career development.

**Off-Farm Agricultural Occupations**

While there is general agreement that farm employment has been declining and will likely continue to do so, the work force in nonfarm agricultural occupations (those requiring agricultural knowledge and skills) seems to be increasing as indicated by literally hundreds of studies of the nonfarm sector of agriculture.

The scope of these studies has ranged from local communities to statewide with some national effort and from single occupations in agriculture through the off-farm agricultural complex to the total occupational structure. Such diversity in approach yields results that are not readily subject to meaningful summarizations.

It is proposed in the project of Heady and others (1968) cited previously that techniques in economic analysis similar to those used in describing the changing structure of production agriculture will be employed to project changes in the structure of the off-farm agricultural labor force for the nation. At the time of the preliminary report, however, trends had not been established.

One of the most comprehensive studies of agricultural occupations was by Dillon and Cain (1966) in the Ohio and Kentucky counties included in Appalachia. From a sample including 284 firms selected within the 28 county area, a total of 126 agricultural job titles was identified. About 40 percent of all workers in the selected firms was found to require agricultural knowledge and skills in their jobs.

Studies of off-farm occupations since 1965 have shown more diversity in purpose and method than those immediately before that year. The more recent work has focused more upon specific groups of occupations, and in a number of instances technician-level occupations were the subject of study. For example, a study was made of the need for technicians in ornamental horticulture in Ohio (White 1967). He found that the number of such positions was expected to increase nearly threefold from the 807 found in 1966 to 2,179 by 1972. Other studies of horticultural occupations were completed in New Mexico (Cobb 1967) showing an expected 87 per-

cent jump in employment in five years and in Washington (Hansen 1967) where 93 percent of the employers reported a major problem in filling vacancies with qualified personnel.

Similar studies have been conducted of the need for farm tractor and machinery mechanics (Hergenreuter 1966), meat inspection and laboratory caretakers (Mayer 1968), agricultural equipment, chemical and nursery businesses (Penn 1966), farm machinery sales and service occupations (Couvillion 1967), retail fertilizer distribution (Powell 1965), and food processing (Shepherd 1966). In every instance substantial numbers of entry opportunities were anticipated as a result of expansion and employee turnover.

There continues to be a great number of studies of the entire spectrum of agricultural occupations. Many studies involved have entailed a complete survey of agricultural business firms; some have used random sampling techniques. The firm has been the basic surveying unit.

In Nebraska a system has been developed by the Research Coordinating Unit to determine occupational opportunities for all vocational fields and to keep the data current (Horner and others 1968). The system involves maintaining a master list of all firms in the state and conducting interviews in a three percent sample of these firms. Using such a procedure it was estimated there were 133,452 currently employed in agricultural occupations in the state. Openings in the next two years were expected to amount to 2,800 in professional and managerial occupations, 6,900 in agricultural supplies and services, 1,167 agricultural mechanics, 7,467 in agricultural resources, 1,400 agricultural laborers, 1,833 in agricultural loan officers and 100 veterinary assistants.

In another study seeking to describe the total occupational situation (Carpenter and Coile 1968), interviews were conducted in every establishment including the self-employed except farms in Dillon County, South Carolina representing 7,346 jobs. The number of farmers was added as taken from the Census to give a total work force of 10,827. More than nine of every 10 workers were said to need abilities taught in vocational education courses. Approximately seven percent of the workers were said to need agricultural competencies. When farmers were added, 37 percent of the work force used agricultural competencies on the job.

In spite of the extensive amount of research in agricultural occupations, the point has not been reached where those planning agricultural education programs have the data needed for adapting programs to occupational needs of clientele. Variation from one area to another is substantial and continually shifting. The expense and time required to keep such studies up-to-date would seem prohibitive using local survey procedures. Therefore, it seems likely that responsibility for such activity will have to be accepted by state employment services and others making nationwide efforts to project employment trends. To date, work of the employment services has not been very useful for agricultural education because agricultural employment other than farming has not been categorized separately. Developing a feasible means for accomplishing this may well be the most valuable con-

tribution that could be made by researchers who are interested in studying agricultural employment. By so doing, trends in off-farm occupations not yet available may be determined.

Only a few of the hundreds of studies for determining present and projected employment in off-farm agriculture have been cited above. The single conclusion which seems inescapable is that efforts to prepare workers for these occupations are, as yet, grossly inadequate considering the consistent findings that employers are unable to hire competent workers in sufficient numbers for the positions available.

## TEACHER EDUCATION

Teacher education has been called the heart of the educational program. Agricultural education has contributed leadership in vocational education because it has had a strong heart. Teachers of agriculture have often been called some of the best prepared teachers in public education. Because of the continuing need for strong leadership and excellence in teaching, the teacher education program merits our attention.

### Description and Appraisal of Programs of Teacher Education

A number of studies have described and/or appraised programs of teacher education. Cameron (1967) selected and developed two laboratory approaches for teaching basic woodworking technology to students in agricultural education. He further selected and described the desired behavioral outcomes of the students involved in the program. It was concluded from this study that those students taught by the "timed learning experience laboratory method" had a greater percentage of gain on both written and laboratory tests than students taught by the "project orientated method."

Claridge (1967) employed a questionnaire to obtain data from graduates of the University of Arizona who had taught vocational agriculture in order to determine the areas of instruction needed in agricultural mechanics. Nearly half of the respondents indicated that more time should be given in the instructional areas of agricultural mechanics. Kelly (1968) attempted to evaluate the preservice agricultural education curriculum in terms of competencies needed by teachers of vocational agriculture. Lists of competencies were developed for the areas of general education, professional education, agricultural economics and farm management, agronomy, animal science, and agricultural mechanics.

Eaddy (1965) conducted personal interviews with people having knowledge of the program and relied upon available writing to critique the development and to offer recommendations for the improvement of the program of vocational education in agriculture in Florida. Findings from this study indicated the majority of vocational agriculture departments

offer high school students and farmers an opportunity to interact with the kind of content defined, practice the kind of behavior implied, and obtain satisfaction from the experiences selected to achieve course objectives.

Justice (1968) developed a questionnaire to determine how the collegiate FFA might function more effectively to serve the needs of students enrolled in agricultural education. A total of 130 students participated in this study and indicated that more attention should be given to carefully planned educational activities involving larger numbers of the membership and a closer association with active graduate students.

Hemp (1966) attempted to determine the effectiveness of summer institutes or workshops as a means of developing effective curriculum materials as well as upgrading teachers in service. At the conclusion of the program which involved 30 selected teachers all evidence indicated this approach to be quite effective.

Blankenship (1968) used questionnaires and scholastic records to determine the occupational status of graduates in agricultural education and to determine the graduates' evaluation of courses completed in the undergraduate curriculum. Student teaching was considered the most valuable course.

**The Teacher and the Role of the Teacher**

Studies on the role of the teacher and factors pertaining to teaching interested several researchers. Asher (1968) developed and administered a questionnaire to determine the significance of certain factors in causing students to enroll in agricultural education and subsequently plan to teach. Todd (1968) developed a survey instrument and conducted personal interviews with teachers to obtain information of value in improving the teacher education curriculum. Findings indicated that 95 percent of the teachers desired in-service education to enhance their effectiveness.

Thell (1965) surveyed superintendents and principals as a means of determining their interpretation of desirable characteristics of agricultural instructors. Johnson (1968) identified opinion leaders among teachers of agriculture and studied the characteristics of these opinion leaders. Rose (1966) randomly selected teachers from four states to determine the similarities and differences in the social participation role of vocational agriculture teachers and nonvocational teachers. Findings indicated that teachers of vocational agriculture had significantly higher social participation scores than did nonvocational teachers.

Strouse (1968) randomly sampled teachers of vocational agriculture from four states to compare the level of morale of vocational agriculture teachers within these states. Morale was measured by the Purdue Teacher Opinionnaire which yeilds a total morale score and scores on 10 morale factors.
Findings indicated a positive relationship between morale and the extent to which selected in-service activities performed by state supervisory personnel contribute to the competence, success, and satisfaction of vocational agriculture teachers.

## Recruitment and Retention of Teachers

A widespread shortage of teachers continues to exist as indicated by a recently reported study conducted by Woodin (1968a). It is anticipated that the shortage will become more severe in 1970. A total of 10,221 positions in teaching vocational agriculture was reported with 1,104 replacements needed during the school year. There were 242 teachers with temporary or emergency certificates, together with 232 teachers needed but not available. This represents nearly 40 percent of the total number of replacements.

Ferguson (1966) conducted a study of graduates in agricultural education to gather information from those who entered teaching careers and from those who did not teach or left the teaching profession. The purpose of this study was to determine factors which influence retention of teachers. Froehlich (1966) conducted a similar study involving 1,117 agricultural education graduates to identify possible environmental factors which may have influence on whether or not agricultural education graduates remain in the teaching profession. Factors identified as influencing graduates to leave vocational agricultural teaching were lack of advancement opportunities, salary, too many evening responsibilities, and long hours. Harvey (1967) also conducted a study for the primary purpose of determining why men leave the agriculture teaching profession.

Severance (1966) surveyed graduates in agricultural education who did not teach vocational agriculture in order to determine their occupational status. Most of the respondents indicated they were highly or reasonably well satisfied that agricultural education as a curriculum provided helpful instruction toward their present occupation. Thompson (1966) attempted to discern those factors contributing to the career development of former vocational teachers employed in other occupations. It is interesting to note that a positive attitude toward reentering vocational teaching was held by a majority of the respondents.

Pasour (1967) attempted to determine the source of students who had enrolled in agricultural education over a period of years. Data were gathered from student files which indicated that counties which had more vocational agriculture programs tended to furnish more students enrolled in agricultural education. Also it was found that a large percentage of enrollees were transfer students from other curriculums.

## Student Teaching in Agricultural Education

Although student teaching is recognized as the capstone experience in the teacher education program, relatively few studies on this important activity have been reported during the last three years. Hudson (1968) gathered information by means of a questionnaire from teacher education departments in a number of states. Practices followed by various institutions in their teacher training programs were reported together with such requirements as admission to the teacher education curriculum and admission to the student teaching program.

Starr (1966) compared student teaching centers with a random sample of vocational agriculture departments to determine if the agriculture mechanics program, the educational preparation of the instructor, and the facilities of the shops of the student teaching centers were superior. Findings indicated the student teaching centers to be superior to the random sample of non-student teaching centers in a number of areas. Wiggins (1968) investigated the student teaching experiences to determine if they caused significant effect in changing the attitude of student teachers toward participation in FFA activities. Analysis of the data indicated that student teachers who changed their attitudes were significantly influenced to change toward the direction of the expressed opinion of their cooperating teacher. This study tends to point up the importance of carefully selecting cooperating teachers.

Miller and Pasour (1967) studied the attitudinal changes toward adult education during the student teaching period. Findings indicated a gain in favorable attitude toward adult education as a function of public school experiences. As a result of this experience, student teachers felt that teachers should devote a greater percentage of their time to adult work than had been indicated prior to student teaching.

**In-service Education**

Although the importance of in-service education is being recognized more and more, there is still a lack of extensive research in this area. Because of the rapid rate of change and because of the favorable impact that in-service education can have on the quality of education in the public schools, this is viewed as an area requiring intensive study. Brown (1967) attempted to determine the effectiveness of a resource unit in dairy cattle nutrition used in an in-service teacher education course on the learning of teachers and their students. Components of the resource unit were furnished as teaching aides for use in classrooms. Findings indicated that teachers who used the resource unit in the in-service training program gained significantly more cognitive knowledge than the control group; however, in-service teacher education did not significantly affect the subsequent learning of the teachers' students.

Ellis (1968) conducted a study to determine how teacher educators and state supervisors in vocational agriculture can become more effective in the implementation of planned behavioral change among teachers of agriculture. The major conclusion drawn from this study was that teacher educators and supervisors of vocational agriculture can be more effective in the implementation of behavioral change among teachers of agriculture by identifying and associating with opinion leaders and becoming aware of sources of information which teachers of agriculture use in the adoption of educational innovation. Gaylord (1968) also studied the teacher of vocational agriculture as an adopter of new practices. Findings indicated there were significant differences among the proportions of teachers in each of four adopter categories in regard to the use of impersonal and personal

sources of information. Impersonal and nonlocal sources exerted more influence on the teachers than did personal and local sources in all categories. Perhaps this reinforces the practice of bringing in outside resource persons to conduct in-service education programs.

Love and Curtis (1967) compared the educational effectiveness of three-day summer workshops with a series of weekly classes taught during the regular school year in a teacher-centered setting and in a student-centered teaching situation. It was concluded that for in-service education courses for teachers of agriculture other factors such as convenience were more important than the alternative scheduling sequences tested. This study did not determine whether teacher-centered or student-centered instructional methods were more effective for teaching off-campus in-service teacher education classes.

Hoerner (1968) surveyed teachers to determine the competence needed and possessed in seven areas of agricultural mechanics by teachers of agriculture and to identify relationships with selected teacher and program characteristics. Findings indicated teachers with more years experience had higher competencies in general mechanics and welding. Teacher competence in the largest number of skills was obtained in college or was self-taught.

Kruskop (1966) conducted a study to determine the farm management competencies needed by vocational agriculture instructors and where these competencies are acquired. The four most needed competencies identified were: (1) an understanding of farm record keeping and farm business analysis, (2) the ability to analyze and interpret records, (3) an understanding of wise use of credit, and (4) the ability to keep accurate and relevant records.

Benson (1968) conducted an experiment in in-service teacher education employing selected instructional media related to control devices in agricultural automation. Two groups of teachers were selected and one group was given formal in-service teacher education classes using a resource unit developed for students and another unit developed for teachers entitled *Controls for Automation in Agriculture.* Teachers from each group were then randomly assigned to one of three amounts of teaching materials, namely: (1) student resource unit, (2) student resource unit, student laboratory manual, and teacher unit plan, and (3) student resource unit, student laboratory manual, teacher unit plan, and visual materials. Findings indicated that receiving or not receiving formal in-service teacher education, when the amounts of teaching materials furnished to the teachers were not considered, had no differential effect on teacher learning or on student achievement.

Nattress (1967) conducted a study to identify competencies needed by vocational agriculture instructors in teaching crop and soil science. Forty competencies were listed by a panel of consultants, and teachers of agriculture indicated that all 40 of the competencies were needed to some degree. Thus, the findings would imply a definite need for more extensive training in crop and soil science for prospective vocational agriculture

teachers during the years of their undergraduate study as well as an improved and expanded in-service training program for experienced instructors. Bejot (1967) determined from his study that 98 percent of the instructors contacted indicated a need for in-service education. Over half of these instructors indicated a willingness to travel 40 to 60 miles for such training. They also indicated they preferred evening meetings of a duration of two hours between the hours of 7 and 10 p.m. A majority of the instructors indicated that college credit should be given for in-service training toward an advanced degree.

Juergenson (1966) studied the performance of limited status students compared to regular graduate students in agricultural education. Students lacking the required grade point average for admission to graduate school entered as limited status students provided they could furnish additional evidence of teacher potential as determined by a jury which subjectively evaluated the candidates. Findings indicated that both groups performed equally well when teaching. Also, there appeared to be no relationship between the performance of the limited status teachers and their undergraduate grade point averages. There was a significant difference in all grades received by the two groups at the post-graduate level with the limited status students lagging behind.

**Conclusions**

The paucity of studies on student teaching should either indicate a high degree of satisfaction with present practices and procedures or the extreme difficulty inherent in designing and conducting studies in this area. Many teacher educators believe the latter to be the case. Since student teaching is considered to be of great importance in the teacher education program, it could well serve as the prime source of impact on the program.

Teacher educators recognize that supervising teachers can easily nullify the efforts of the university during the initial period of observation by the student teacher. Most young men seem to assume they are expected to imitate the assigned supervising teacher. The importance of additional research designed to alleviate this situation cannot be overemphasized.

The recognized need for in-service teacher education has greatly influenced legislation and gained attention from administrators at all levels. However, there is still much to be done in developing the most effective and flexible approach to accomplishing this gigantic task. Research can give direction to this effort and insure the efficient expenditure of funds.

Behavioral objectives have attracted the attention of many educators concerned with curriculum development. Therefore, it appears prudent that teacher educators give more attention to the study of teacher behavior in revising the teacher education curriculum.

## LEARNING PROCESSES AND TEACHING METHODS

Although a number of studies have been undertaken dealing with learning processes and teaching methods, there are many blind spots which need to be overcome by an organized effort to research this important area thoroughly. Amick (1967) designed a study to compare the effectiveness of animated slide instruction and nonanimated slide instruction in a unit taught to high school biology students. Students learned from both animated and nonanimated slide instruction and there was no significant difference found between the two methods of teaching. By personal observation, the investigator found that students given the animated slide presentations seemed more alert and gave more of their attention to the presentations than those given the nonanimated instruction.

Curtis (1967) tested the effectiveness of simulation in teaching farm business analysis to both high school and adult students. Decision-ability test scores of the high school students were not significantly different among the five methods of instruction used. Hence, the simulation model was equally as effective as the other methods of instruction. Adult students scored higher than high school students on the test. The increase over pretest was also greater for the adult learner. This may indicate that farm business analysis and record keeping instruction can be taught more effectively to adults.

Duffy (1968) planned and conducted a series of nonstructured discussion group meetings designed to gain leadership development: (1) by functioning as the leader of the group of male vocational high school students, (2) by attempting to relate more effectively to the students in an informal situation, and (3) by securing varied experiences in working with the group. He concluded that such a practicum project can be invaluable experience for teachers, counselors, and others planning to develop their leadership abilities.

Nelson (1967) compared the effectiveness of the lecture method of teaching with that of the lecture method combined with laboratory demonstration. In this study he found no significant difference between the two methods employed. Hannemann (1968) studied the effect of auditory and visual motion picture descriptive modalities in teaching perceptual motor skills used in grading of cereal grains. Analysis of data indicated the visual descriptive supporting modality was more effective than the auditory descriptive supporting modality for identification of parts of the apparatus used. However, the visual and auditory descriptive supporting modalities were equally effective in teaching students to imitate perceptual-motor skills demonstrated by the motion picture.

Litwhiler (1967) conducted a study to determine the effectiveness of cooperative work experience for high school students when associated with classroom instruction in turf grass management. The presence or absence of cooperative work experience did not affect the test scores of students with equal ability. It was concluded that for most effective learning, work

experience should follow classroom instruction. Student gains on the test were related more nearly to the level of ability of the students than to the methods employed in this study.

Long (1967) compared the effectiveness of programmed instruction and conventional learning with freshman vocational agriculture students. Although results were not consistent among different groups of students, there was an indication of the effectiveness of programmed instruction evidenced by significantly higher mean raw scores on a parliamentary procedure unit by the low reading achievement group. Also, programmed instruction appeared to be effective with students who manifest little interest in vocational agriculture. This research reinforces the findings of many others, namely, that programmed instruction is quite effective for certain units of instruction and for certain types of students.

Pope (1967) attempted to determine whether there was significant improvement in test achievement of poor readers when these students used auditory assistance while taking objective pencil and paper tests. He concluded there was no advantage in using auditory assistance to help poor readers' performance on pencil and paper tests. Apparently, there is no substitute for learning to read which involves learning the meaning of words. Way (1967) studied the teaching methods used by teachers of agriculture in Oregon. He found almost 99 percent of the teachers used group discussion as a teaching method. The method ranking second was the "principle approach," which involves giving specifics and helping the students associate them with general statements. This method was used by over four-fifths of the teachers and preferred by nearly one-third of them.

Scanlon (1967) designed a study to determine the relative effectiveness of supplementing programmed instruction with blocked review versus spaced review. There was a significant difference between the program plus blocked review as compared to the program plus spaced review, with those receiving programmed instruction plus blocked review doing significantly better. However, after a period of time there was found to be no significant difference on retention between the treatments. Norton (1967) investigated the use of programmed instruction with and without self-instructional practice to teach psychomotor skills. He concluded the self-instructional practice did not produce any significant benefit over use of the program alone; however, the findings of this experiment clearly indicated that a significant relationship existed between student dexterity and ability to learn psychomotor skills effectively through the use of programmed materials. Fiscus (1968) studied attitudes of teachers of agriculture and other teachers toward team teaching. He concluded the vocational agriculture teachers seemed to be knowledgeable in several subject matter areas other than agriculture and therefore might be included in teaching teams outside the area of vocational agriculture. Also, learning by the student is enhanced by the use of a teacher specialized in the subject matter area; therefore, it is possible that teachers should examine team teaching as a technique to expand their utility in the total instructional program of the school.

McGuire (1966) developed an evaluative case study on teaching basic production economic principles to secondary school students of vocational agriculture. The study showed that high school students can successfully learn and apply basic production economic principles although some students enjoy the instruction and learn considerably more than others. Certain teachers appear to be more effective at teaching economic principles.

Oliver (1968) studied the relative effectiveness of a series of landscape meetings and supplemental illustrated landscape circulars in teaching landscape design concepts to interested adult groups. Analysis of the data indicated there was a direct relationship between participants' formal education level and spatial aptitude scores and their ability to develop a landscape plan; however, there was no significant difference between the adult groups receiving the illustrated circular and those who did not in their ability to develop a landscape plan.

Sullivan and Cardozier (1966) proposed to determine the impact of special reading instruction, integrated into the teaching of agriculture, on improved reading ability and increased achievement in subject matter. Their experimental design involved 12 randomly assigned schools in Maryland. Two schools, one experimental and one control, were selected from each of six major cultural areas of the state. After appropriately pretesting, post-testing, and analyzing the data, findings indicated there were no significant differences between groups in performance on reading, social studies, and standardized science tests using class means as a unit of measurement. However, when individual means were considered, differences between experimental and control groups were significant on both pretest and post-test scores in reading and social studies and on post-test scores in science. It was concluded that some kind of remedial action is essential if students are to profit most from their agricultural instruction, but this experiment suggested further research should be undertaken to improve the procedure.

Wolf (1966) investigated the effects of teaching occupational information on the level of aspiration of Oklahoma vocational agriculture students. Findings indicated the change in aspiration level from the pretest to the post-test was not significantly related to social class value orientation. As student intelligence increased, as measured by wide-range vocabulary test scores, their pretest aspiration level tended to increase. No association was found between urban orientation and high levels of aspiration or rural orientation and low levels of aspiration. Group mean aspiration level tended to increase in a positive relationship as: (1) parental encouragement to attend college increased, (2) post-high school training planned increased, (3) parental income increased, and (4) student leadership activities increased.

Research studies seem to indicate that many methods can be used successfully in teaching vocational agriculture. However, some teachers find relatively more success with certain methods than others. This points up the need to consider subject matter, students enrolled and the teacher involved in selecting a method or methods to use in teaching a course.

Research involving the use of a method in a set of circumstances gives little or no room to generalize on the outcomes. Hence, there is indicated a need for more practical approach of describing the kind of students and the nature of the teacher and subject matter involved in successful employment of a particular method.

## INSTRUCTIONAL MATERIALS AND DEVICES

The importance of developing good instructional materials relative to the diversified instruction in vocational agriculture programs has taken on a new dimension with the increased emphasis on individualized instruction and recognition of those who are classified as disadvantaged and deprived students. Additional emphasis has been given to integrating instruction in the various disciplines or attempting to make the so-called academics relevant to the aims, goals, and ambitions of students enrolled in vocational areas. Although additional efforts are being put forth in the development of materials, there is still great need for coordinated effort throughout the states in developing high quality materials for use in vocational classrooms.

Hannemann (1967) attempted to determine the type of instructional media to which teachers of agriculture have access and which they use. His findings indicated the 16mm motion picture projector to be the predominant item of instructional equipment available to teachers of agriculture. Other items readily accessible included the 2x2 inch slide projector and film strip projector with more and more teachers gaining access to 8 mm film loop projectors. Also a large percentage of teachers have at least limited access to overhead projectors and the majority of teachers indicated that they use all of these projectors in teaching their subject matter areas.

Smitley (1968) studied the use of visual material in teaching ornamental horticulture. A purpose of the study was to develop a workbook of drawings and descriptions to be used along with a set of color slides. Recommendations arising from this study include: (1) that drawings, descriptions and slides be changed as experience with their use is gained, (2) that more slides showing seasonal changes in the plant should be added, (3) that a set of overhead projector transparencies be made, (4) that the effectiveness of such an approach to individual instruction be compared with other methods, and (5) application of these procedures should be extended to all areas of horticulture which include identification of plants.

Matteson and Thompson (1967) studied the need for instructional materials in high school vocational agriculture in Wisconsin. Their findings indicated that approximately 84 percent of the teachers had changed their high school programs within the past three years thereby greatly increasing the need for additional up-to-date teaching materials. Most of the teachers indicated a great need for additional instructional materials which could be prepared in a materials preparation center and would greatly enhance their teaching programs. Carey (1967) investigated the effectiveness of colored slides and script for teaching protection from fallout in rural areas to high school agriculture classes. These teaching materials were developed

in recognition of the lack of experience and lack of background among most teachers who would be expected to use the materials. Also, a verbal presentation was prepared to be used in lieu of visual materials and in addition to visual materials with different groups. Findings indicated that greater learning had taken place when the colored slides accompanied the verbal presentation.

Ayers (1967) developed and evaluated a unit of instruction and found it to be effective in teaching small gasoline engines to vocational agriculture students. Dewitt (1968) developed a reference text on small engines and tested it in six vocational agriculture departments. Findings indicated the book could be enhanced through revision and that both film strips and overhead transparencies could be used parallel with the textbook to good advantage.

Musser (1968) developed and evaluated a unit of instruction in forest management. It was found to be effective in teaching forest management to agriculture students as measured by teachers' reactions. Hash (1968) constructed and standardized a multiple choice achievement test in forestry education for secondary schools. The reliability coefficient of the final form of the test calculated by Kuder-Richardson Formula 20 on the cross-validation sample was .88; the standard error of measurement was 4.45. Point biserial correlations (discrimination indices) of all items selected for the final form except two were significant at the .05 level by t-test.

Ferries (1967) developed an achievement test in soil science. Individual test items were analyzed to determine their effectiveness in predicting high and low scorers on the test. All items except three were highly significant in predictive ability. Percentile rankings were developed as a standardization procedure for the test instrument. The test appeared to be a valid and reliable instrument for the measurement of achievement in soil science. It was recommended that the further construction and evaluation of a battery of similar test instruments would be a value to teachers of vocational agriculture.

Jensen (1967) investigated the possibilities of developing a low-cost overhead transparency for use by teachers in vocational subjects. His findings indicated it is possible to produce, by a mass production approach, an effective and economical overhead transparency. Material costs for transparencies produced by this approach, when large quantities are considered, average only a fraction of the cost for materials available to most classroom teachers. Most teachers who evaluated the transparencies rated them as very effective and their quality as acceptable. All teachers agreed there was a great need for materials of this nature and that this transparency project should be continued.

Barker (1967) developed an appraised instructional unit to enhance student understanding of profit maximizing principles. It was concluded that the profit maximizing principles approach to farm management instruction greatly strenghtened this phase of the vocational agriculture curriculum.

Hensel and Johnson (1967) evaluated the content of course outlines and instructional materials prepared for teaching off-farm agricultural occupa-

tions. A major purpose of this study was to determine the extent to which the materials developed by The Center for Vocational and Technical Education had influenced local and state programs in each of the occupational areas. Also, they were interested in determining the effectiveness of the materials as they were utilized in the classroom and their acceptance by local teachers. State supervisors of agricultural education indicated the materials were used extensively in planning state programs in off-farm agricultural occupations. Most vocational agriculture teachers who had used the materials indicated that they were of great value in initiating and developing off-farm agricultural occupations programs.

Magisos and Sleeth (1966) investigated the effects of experimental use of visual instructional materials. In a summer workshop, 16 teachers were cooperatively involved in preparing overhead projection masters. Information gathered later indicated that most of the teachers used the transparency masters. It was concluded that this type of workshop is effective in keeping instructors up-to-date with swiftly changing times. Another benefit from such workshops is the development of additional capabilities needed by teachers to make effective use of modern technology in education.

New devices and adaptations appear on the market at an increasing rate. Each device is marketed as a means of saving time and effort for the teacher or as a means of making instruction more effective. In reality, these devices are tools for use by a teacher who can use them well or misuse them. A tool misused usually causes damage to something. In the teaching-learning process this damage is likely to be focused on the teacher or the learner, or both. Hence, the results are tragic.

Although we must avail ourselves of the benefits to be derived from technological advances, it is imperative that teachers be instructed in the proper use of these "tools" prior to employing them in classroom situations. Also, it is necessary that visual, audio and sensory equipment be used with appropriately sequenced materials of proper intensity to provide the learning experience desired.

Adoption of the technological devices will necessitate increased emphasis in developing appropriate instructional materials. The effectiveness of many of the devices is directly related to the quality of materials used with the devices. This appears to be an emerging area of specialization in agricultural education.

For a number of years educators in the field of agriculture have been concerned about the indexing of reference materials and the filing of such materials. Woodin's (1968) investigation of the filing systems used by teachers of vocational agriculture in the United States revealed that 22 states recommended no particular filing system. In 24 states a uniform filing system was recommended and 16 of these states recommended the Agdex system. It was concluded from the study that enough were using the Agdex system to make it possible to start precoding materials sent to teachers.

## CURRICULUM DEVELOPMENT

Studies of competencies required for occupational success are still the focal point of many curriculum development projects in agricultural education. Much of the work has centered upon competencies required of farmers, but there has also been a substantial effort to determine competencies needed in a broad range of off-farm agricultural occupations.

The method of determining competencies has varied. An extensive amount of work has been done at Iowa State University concerning competencies needed by farmers. In these studies the usual pattern has involved the use of experts to develop a list of competencies after which the list is subjected to workers in the field. As a rule comparisons have been made between the degree farmers thought they (1) needed and (2) possessed the competencies. Also, the relationship between selected characteristics of farmers and the degree of competence they possessed was usually tested. Competency areas studied recently in Iowa include: animal nutrition (Christensen 1968), swine production (Harper 1968), farm business analysis (Christy 1966), farm credit (Anderson 1966), farm labor utilization (Beaver 1967), farm machinery program planning (Kordick 1967), electricity (Hoerner 1966), agricultural law (Smalley 1968) and forage crop production and utilization (Abel 1966). This work, when added to several studies completed earlier in the same state, provides a valuable basis for developing course materials to be taught to present and future farmers.

Competencies in occupations in the off-farm sector have been investigated in many states. Some of the studies have centered on narrow occupational groups (greenhouse growers—Parsons 1966) while others have covered the broad spectrum of agricultural occupations (Sims 1966). As might be expected the studies of narrower fields tend to result in quite specific skills and knowledge to be incorporated into courses; whereas, broader-based studies have pointed up the value of a general knowledge of agriculture and human relations skills to occupational success. Both types of results seem too important to ignore.

Several workers are continuing to use rather sophisticated statistical tools to attempt to derive meaningful groupings of competencies that will be helpful in course organization. Sjorgren and others at Colorado State University (1967) reported a carefully conducted project in which 466 interviews were made of workers in 47 agricultural occupations and 36 occupations in the metal fabricating industry. Results were subjected to extensive factor analysis to derive clusters with common elements. A total of 329 variables were analyzed including items concerning work environment, physical activity, supervisory activity, personal contact and other behavioral traits demanded by the jobs. The traits clustered into three groups for the 47 agricultural occupations: production agriculture, agricultural industry and agri-business. It was found that production agriculture workers have a much higher intellectual requirement than do those in agricultural industry. The agricultural industry and agri-business occupations exhibited more commonality with industrial and business occupations in the metal fabricating industries than with production agriculture.

Several workers have added a dimension to competency studies by studying the degree to which a competency is important (1) to enter and (2) to advance in an occupation. The second aspect has been included in three studies from Pennsylvania State University (Paules, Love and Gunderson all in 1966). In the interviews conducted in connection with these studies the competencies selected were rated in importance to enter and again to advance in the occupational field. Factor analysis was used to determine competencies considered most crucial in each instance. As anticipated many of the same competencies were important for both entering and advancing with a higher degree of proficiency required to advance.

Analysis of subject matter and surveying of professional opinion have continued to be important aspects of curriculum research and development. In practice, the typical curriculum builder in agricultural education considers results of a competency study of his own or of another investigator, seeks out expert opinion by formal or informal surveys and uses experienced teachers to assist in developing a curriculum outline and related teaching materials to meet the specific needs of clientele to be served. Recently developed curricular materials have tended to be prepared in far greater detail than those of a decade ago and teaching aids frequently accompany the material.

Using variations of the procedure described above an extensive amount of new curricular material is now available for use by teachers. Much of the work has been done by teacher education departments in cooperation with state supervisory staff members and teachers. A series of instructional materials to be used in post-high school programs has been developed by specialists called to The Center for Vocational and Technical Education. Course materials for several specialized occupational areas in agriculture were prepared by the specialists under direct grants from the Office of Education.

Competency studies have been of considerable assistance to persons who develop curriculum materials. Much has been learned from such research about the technical subject matter and vocational skills required of workers on the job. There are also a few generalizations which are apparently applicable to most occupations since they consistently appear in the summaries of so many studies.

1. Human relations skills are considered by employers to be extremely important for job security and advancement.
2. The ability to use simple mathematics effectively and English correctly generally overshadows technical competence in importance for entering and advancing in off-farm occupations.
3. Many off-farm agricultural businesses are small and not susceptible to a high degree of specialization; thus, employees are expected to perform a wide variety of tasks.
4. The greatest demand is for workers who exhibit potential for moving up to managerial or sales positions.

5. Desirable character traits such as honesty, dependability, and initiative are of utmost importance when selecting new employees.
6. Employers generally are anxious to cooperate with educational programs offered at school including making arrangements for on-the-job training stations.

These generalizations emphasize the fundamental importance of a solid general education as preparation for the job market. Few would argue against that. Even more important, however, is the serious philosophical question which is raised. Is not keeping youth sufficiently interested in school so they may maximize their general educational development the most important value of vocational education? If this is true then the recent furor over providing specific training to meet skill and technical knowledge requirements of the labor market will have been largely senseless. Rather, students should have been encouraged to pursue their strongest interests limited only by their abilities.

As previously noted, the competency studies of recent years have made an important contribution to curriculum building. However, in view of recent work conducted primarily in other fields of education it would seem that workers in agricultural education should add a new dimension to curriculum construction. This dimension would involve appropriate use of behaviorial objectives. Work of Mager (1962) and more recent publications of Popham and Baker (1970, a and b) offer sufficient encouragement for the development of objectives stated in terms of specific, observable behaviors which are to be expected of students satisfactorily completing a course or unit. From such objectives, imaginative educators could develop learning packages which should greatly exceed the effectiveness of most teaching-learning material being used in agricultural classes across the nation today. Such a project would involve an extensive amount of detailed work. It would require some of the most talented workers in the field. But, the resulting materials would be applicable for similar courses throughout the country. The increased educational progress of so many students should readily justify the effort.

## ADMINISTRATION AND SUPERVISION

### Administration and Supervision of State Programs of Agricultural Education

During the past few years a great deal of attention has been given to the new directions in agricultural education. The development of sound educational programs to prepare employees for the occupational opportunities emerging in our changing society has been a prime concern of administrators at all levels. In response to this concern several attempts have been made to develop guidelines, handbooks, and procedural outlines for use in establishing agricultural occupations programs.

Linson and Anderson (1964) developed a handbook for use at state and local levels in developing and operating agricultural occupations programs. Another document prepared to orient administrators, teachers, counselors and others to the emerging concept of nonfarm agricultural occupations was prepared by Hamlin (1965). Also, the California State Department of Education published a report of conference proceedings of supervisors and coordinators aimed at determining occupational opportunities and vocational education adjustments needed in meeting the manpower and employment situations.

Luster's (1966) report on "The Center Project in Off-Farm Agricultural Occupations," indicated the greatest occupational opportunities are in sales and service, horticulture and agricultural machinery. Taylor's (1964) report of a National Seminar on preparing agricultural technicians, focused attention on the responsibility for providing leadership for the development and expansion of such a program. It further set forth detailed guidelines for the development of training programs for agricultural technicians. Virginia Polytechnic Institute staff members (1966) expressed an emerging concept of the role of agricultural education by formulating "The Purposes of Agricultural Education" for the State of Virginia. McDowell (1965) made a study in Kentucky to determine the needs for a comprehensive area vocational school. His findings indicated that the director should have considerable vocational education experience, teachers should continue professional growth, vocational guidance is necessary for youth and adults, and an advisory committee is needed. McGhee (1967) reported the teachers of vocational agriculture in West Virginia had varied technical and professional in-service education needs which should be met by off-campus and on-campus courses and workshops.

*Personnel Roles.* Boardman's (1966) study of the administrative role of the FFA executive secretary revealed there is no significant difference in the perception of the administrative role of the state FFA secretary by executive secretaries and state supervisors of vocational agriculture. The ideal and actual roles of the executive secretary were considered for administering both the FFA program and the total vocational agriculture program with no significant difference in the perception of the two groups recorded.

Rawson's (1968) investigation of the role of state supervisory staff in improving the instructional program was based upon the response of vocational agriculture teachers. The study indicates the teachers expected the supervisor to pursue practices in developing effective vocational agriculture programs. Also, supervisors were expected to discuss problems of the agriculture program with school administrators and to suggest improvements in teaching techniques and instructional practices. Teachers indicated they wanted to be notified before a supervisory visit was made and that a supervisory report should be returned to the school after a visit. They also indicated the desire for one summer supervisory visit and to be informed of the teaching jobs available in the state. They were highly in favor of supervisors visiting the guidance department in the school to discuss opportunities available for students taking vocational agriculture and the practice

of assisting agriculture teachers in developing adult and young farmers classes. Teachers did not place much importance on the practice of assisting in developing a stronger FFA Chapter and acquiring an outline of objectives and philosophy of the vocational agriculture program. Supervisors were viewed as having an important role in the formal evaluation of the vocational agriculture department.

*Program Availability.* An investigation by Harris (1966) of some of the needs for expansion of vocational education in selected counties of West Virginia revealed that as enrollment in these courses increased the dropout rate declined. The data further revealed that the high school dropout rate was significantly higher in schools whose graduates entered college in greater numbers. Based upon the findings of the study, there is a need for more educational and vocational guidance. An analysis of the data revealed that 73 percent of the students surveyed desired some type of vocational course in high school.

McClurg's (1968) study on the availability of vocational agriculture programs in Iowa revealed that considerable expansion of existing programs and the addition of approximately 100 programs would be necessary to provide an opportunity for all boys who need vocational agriculture to have access to such programs. Smith's (1968) study to determine the need for multiple teacher departments of vocational agriculture in Nebraska found great differences in the factors affecting teachers in the various departments and concluded that a study of local conditions would be needed to determine when an additional teacher should be employed in a department.

*Factors Influencing Programs.* In a study to determine the cost to local school districts in maintaining a vocational agriculture department in Idaho, Markwell (1966) found that the average cost of construction was $9.40 per square foot and that the equipment and tool costs averaged $11.27 for each student enrolled. Nelson's (1966) investigation of the source and extent of economic commitments to public education in Minnesota revealed a positive relationship between adjusted assessed valuation and vocational enrollment ratio, thus indicating that wealthier districts offer relatively more vocational training opportunities. School district size was found to be negatively related to vocational enrollment ratio, indicating that smaller districts offer relatively more vocational education opportunities. Vocational agriculture offerings were found to have a highly significant positive relationship with the vocational enrollment ratio.

Love's (1968) study of the administration of agricultural education in 11 land grant universities furnishes considerable descriptive data on student enrollment, program status, budget, salaries, allowances, program goals, special courses, degrees conferred, certification requirements, placement of graduates, and equipment owned.

Smith's (1967) study to determine why some school districts do not offer agriculture indicated a lack of awareness of new program opportunities associated with the agri-business concept of vocational agriculture. A majority of the school officials interviewed listed "not an agricultural

area" as the main reason vocational agriculture was not being offered in the school. All of the administrators expressed a desire for more information regarding vocational education.

Rodgers (1968) reported several ideas from a training institute for administrative personnel and teacher educators responsible for young farmer education. There was consensus that credit for young farmers enrolled, as well as for high school students, should be considered in determining teacher load. The group concluded that young farmer education could be strengthened through the development of pilot programs. Also, the need to initiate and develop a research program was recognized. The "systems approach" in education seemed to hold great promise for boosting young farmer education. Much effort should be expended to develop the system which uses maximally the available equipment, facilities, tools, instructors, etc. to motivate students and effect properly sequenced learning experiences. It was concluded that one of the greatest deterrents to program development in young farmer education is the shortage of well-prepared teaching personnel. Also, attention should be given to developing more realistic approaches to evaluating the effectiveness of young farmer education.

Doubler (1968) concluded from his study of adult evening school work in Iowa that the need for adult education in vocational agriculture will continue to increase in future years because food production and processing will employ technological advances and there will be a considerable increase in farm size. Murray (1968) reinforces this conclusion with findings indicating that farmers completed over 85 percent of the farm machinery practices necessary to their commercial operation; whereas they had less than 10 percent of the practices completed by commercial firms. Long (1968) reported results which show that tasks classified as management, marketing, animal care and plant production are performed by large percentages of all categories of farm operators. His study suggested the need for expanding and upgrading programs in animal industry, plant industry, and agricultural mechanization and farm management.

Lebo (1966) proposed to develop a new vocational agriculture reimbursement affidavit for Pennsylvania. He involved selected school administrators, teachers of agriculture, and area advisors in this effort. He concluded that this approach produced an affidavit acceptable to all groups concerned.

Elson's (1969) investigation of the operational procedures for multiple teacher departments revealed that teachers, administrators, and state supervisory personnel should have a direct role in the development of policies for the multiple teacher department. Also, teaching assignments and duties should be made through cooperative effort with other teachers and administrators and teaching responsibilities should allow the teaching personnel to specialize in particular areas. It was concluded that an additional teacher could be justified because of a high demand for young and/or adult farmer classes or a high demand for specialized training of high school students.

## Administration of Programs of Agricultural Education in Local Schools

A number of studies were directed toward problems within local schools or a local school. Dupy and Hull (1966) concluded from a study of local problems that teacher initiative was the most important factor in securing training stations while scheduling problems sometimes adversely affected administrative approval. Wenrich and Van Dyke (1963) determined from a study of the attitudes of local school administrators that the majority felt that vocational programs would be continued if salary reimbursements were eliminated.

Blakely (1967) surveyed administrators and directors of selected schools which offered no vocational agriculture. The two most important reasons given for not offering vocational agriculture were (1) lack of competent teachers and (2) low student enrollment. Some respondents felt that state and Federal guidelines inhabit the establishment of vocational agriculture. Although they thought an agricultural department does cause some added administrative problems, they felt these problems would not be important enough to become a factor in determining whether to establish a program. Amberson (1968) studied certain variables and situational factors associated with high school vocational education programs. Factors such as size of high school student body, the amount of special (state and/or Federal) funds received per student per year, the adequacy of facilities, and administrative attitude greatly influenced the quality of the vocational programs. Langbehn's (1966) investigation of agricultural programs indicated that some students do not choose a particular course but become enrolled because the alternative offerings are less desirable.

Dixon (1967) determined that vocational agriculture teachers were not carrying on good programs of public relations and were not using local school administrators, advisory committees, and school boards in determining the content of local programs. However, over 90 percent of the teachers agreed that vocational agriculture programs should prepare youth and adults for nonfarm occupations in the community.

Hamlin (1965) prepared a handbook for use by local administrators, teachers and others concerned with introducing programs of vocational and technical education for off-farm agricultural occupations. The New York State Education Department (1963) developed a survey form for collecting information on the employment opportunities and vocational agriculture program needs.

### Advisory Committees

Lowe's (1966) comparative study of vocational agriculture departments with formal advisory councils, informal advisory councils, and those having none reveals that both groups using advisory councils achieved greater FFA state and national attainments and conducted broader programs of agricultural education than the other group. Those using formal advisory councils had more graduates engaged in farming in the area, showed a higher degree of interest and support and achieved better working relationships with school administrators. Teachers not using advisory councils gave

such reasons as being too busy, lack of knowledge in organizing and using such councils, and fear that the council would control the program. In a similar study Wallace (1967) found very few disadvantages recognized by teachers who were using advisory councils and all teachers using such councils expressed a great degree of satisfaction from the contributions made by the councils.

Cushman (1965) developed a handbook for boards of education, school administrators, advisory board members and teachers to use in making the most effective use of advisory boards. It treats the role of the advisory board, its purposes, authority, functions and services.

**Professional Relationships**

Miller's (1966) investigation of teachers' perception of principals' views of vocational education indicated that principals were perceived as very favorable in attitude toward vocational agriculture, supervised practice, and vocational education generally.

Bentley and Rempel (1967) studied teacher morale and confirmed earlier findings that women have significantly higher morale than men. They further established that the difference could be attributed almost entirely to two components affecting morale namely, salary and status.

**Conclusions**

Efforts to identify and develop administrative procedures to enhance the impact of programs of agricultural education include: (1) development of hand books and guidelines for use at all levels, (2) the operation of pilot projects, (3) national, state and local seminars, (4) state and local studies of situations, educational needs of professional personnel, roles of personnel, professional relationships and factors influencing programs. Also, attention has been given to the development of forms for recording critical information and/or facilitating certain routine functions such as reimbursement for travel or expenses.

Studies in administration and supervision have focused largely on perceptions held by various groups in education. Superintendents, principals, teachers and program administrators were asked to respond to role perception inventories for administrative personnel. With few exceptions, no significant differences in perception between the position groups were noted. Perceptions and opinions were recorded concerning a large number of administrative functions and/or roles. Also, opinions of programs have gained attention.

Such perceptions and opinions are indeed important but need not greatly influence the process of administering programs. However, scrutiny of studies indicates that recognized principles of administration and supervision, when properly applied to the process, bring highly satisfactory results and foster desirable perceptions. Therefore, it appears that attention should be given to developing the administrative process, on all levels, so that the proven principles of administration and supervision are employed maximally in effecting efficient and harmonious operation of educational institutions.

## EDUCATIONAL PROGRAMS

A total of 851,049 persons were enrolled in some phase of agricultural education in fiscal year 1968 according to preliminary reports of the U.S. Office of Education. In spite of the increasing need for workers with agricultural competencies this represented a decline of nine percent from the previous year, although 33 states reported increased enrollments. Nationally, there was an increase in persons in off-farm agricultural programs of 12.1 percent over fiscal year 1967, indicating there has been a considerable shift out of production agriculture training. The 1968 enrollment of 170,182 in off-farm programs represented 20 percent of the total agricultural enrollment.

The number of agricultural teachers has been increasing from 11,765 in 1966 to 12,278 in 1968 as reported by the Office of Education. It is undoubtedly because off-farm programs require a smaller pupil-teacher ratio that the number of teachers has increased while total enrollments declined.

### Vocational Education in Agriculture for In-school Students

As indicated above, there has been a considerable increase in enrollment in educational programs for off-farm agricultural occupations. It should be pointed out that, although 80 percent were reported as preparing for farming occupations, there was a fallacy in the reporting system. Most states reported all ninth and tenth grade students in the production group whereas in reality large numbers of these should more logically be considered to be in basic courses preparatory for advanced courses in off-farm agricultural occupations. The extent to which this would change the proportion of students reported in off-farm occupations courses is not known; however, it would be substantial.

There has been an abundance of research concerning the educational programs with a predominance of the effort centered around off-farm occupations. Competency studies, reported elsewhere, have emphasized the needs and indicated content for such programs. A number of pilot programs have been conducted and in some instances very sophisticated evaluations have been conducted.

Binkley (1967) reported success with a pilot program for preparing workers in the agricultural supply industry. The program was carefully developed by state supervisory and teacher education staff members. Evaluations were made by teachers, businessmen and students with generally favorable findings. The program was tried in four Kentucky locations; and at one, Reidland High School, it was continued as a demonstration center.

In Illinois, pilot programs were established in four schools to test innovations in agricultural education with two chief objectives: (1) to improve agricultural education for farmers and prospective farmers, and (2) to provice agricultural education programs for occupations other than farming. The interim report (Phipps and others 1965) lists 35 useful suggestions for developing similar programs.

Workers at Cornell University have produced evidence that directed work experience contributes to the effectiveness of programs for off-farm agricultural occupations (Cushman, Hill, Miller 1968). Their project involved developing guidelines and procedures for conducting directed work experience programs which were given a one-year trial in 18 schools in 12 northeastern states. The programs were emphatically endorsed by participating teachers, students and employers. In comparing those students with others in similar programs without work experience significant differences were found on three cirteria. Participants in directed work experience evidenced superior achievement in technical knowledge, a higher rate of entry into curriculum-related employment after graduation, and a higher rate of entry into curriculum-related programs of advanced training. The guidelines and procedures used in this project have been revised and published as Cornell Miscellaneous Bulletin 91, *The Teacher-Coordinator's Manual For Directed Work Experience Programs in Agriculture.*

For several years there has been interest in integrating vocational education content into a single course or courses for all students interested in vocational education. Such a project has been in operation at Paoli, Kansas (Agan 1968). Two courses were taught, "Commonalities in Occupations" for juniors and "Experiences in Occupations" for seniors. Thus, students were able to explore occupations and themselves as a part of the world of work during the junior year and then enter one area of work as a part-time employee during the senior year. Team teaching was employed and teachers and counselors supervised the work experience with the assistance of local business people. Students, parents, teachers and businessmen approved of the interdisciplinary approach.

Work at the Nebraska Research Coordinating Unit gives support to the interdisciplinary approach to vocational education (Dillon and Horner 1968). Data were gathered from 1315 employed persons representing 384 different job titles. Of 144 activities and knowledge areas on a check list, 11 were checked as used by more than 50 percent of the respondents. Another five items were checked by more than 40 percent and 27 items were checked by one-third or more of the workers. Other investigators have also found common elements which are crucial for success in a variety of jobs.

**Technical Education in Agriculture**

Although the need for technical education has been well established by research, investigators have done less in the area of program planning and evaluation when compared with other aspects of agricultural education. A significant contribution in this regard was a national seminar held on the campus of Bowling Green State University, Bowling Green, Ohio in September of 1968. The report of the seminar (Bender 1969) includes guidelines, suggestions and supporting materials for developing agricultural occupations programs in area schools. The scope was not limited to technical level education (adult and high school programs were also included), but the report is one of the most complete available for assistance in planning for technical education. The report is based on study and deliberations of more than 100 professional personnel.

Becker (1968) studied technical agriculture programs in Ohio to determine the relationship between selected characteristics of students and their subsequent success in the world of work. He reported the typical enrollee to be 20 years old, a high school graduate, with a 103 I.Q. who had achieved a 2.25 grade average in high school and ranked at the 46 percentile of his class. Approximately one-half of the students commuted to school and three-fourths held jobs while attending. Employers preferred graduates with farm experience, high grade point averages and high intelligence quotients.

**Adult and Continuing Education**

Almost since its inception, following passage of the Smith-Hughes Act in 1917, the program of vocational agriculture has included special classes for young and adult farmers. In earlier years these classes were generally taught by the regular teacher. More recently, additional teachers have been used for particular sessions and offerings including special classes for various off-farm aspects of agriculture.

By far, the greatest emphasis is still on the program for farmers. For many years Minnesota has led the way in developing a comprehensive program of adult farmer education based upon farm business analysis. In its best form, the program has involved the employment of a full-time adult teacher. Results, as measured in farm income increases, have been so successful there that other states have adopted many features of the program.

Persons (1966) used cost-benefit analysis techniques in studying the effects of the adult farm management program in Minnesota. He incorporated appropriate economic procedures and systematic analysis of actual and opportunity costs along with direct and indirect returns to make an estimate of the economic returns to farmers. The results are based on more than 3,500 records of farmers who were enrolled in the program from 1959 to 1965. Two principal findings indicate excellent returns to investments in this type of educational activity. First, individual farmers on an average received $4.20 in additional return to capital and management for each dollar they invested in the program. Farmer investment in the program was primarily the opportunity cost of their time involved in the educational process. Secondly, the community can expect to generate an additional $9.00 of business activity for every dollar expended in conducting a farm business management education program.

Results from several states indicated that educational television was being used successfully in adult farmer education. Appraisal of these programs has been on an informal basis, however.

A number of other pilot programs are being tried in adult education. The evaluation of these, too, is limited to informally obtained evidence, but results are reported to be promising. Dillner (1968) reported on a project in Pennsylvania leading to development of course materials on "Human Factors in Management." A group of managers, department managers, field representatives, salesmen and other key workers in agricultural businesses were reported to be enthusiastic about the results after attending a series of classes in which the materials were used.

Other adult education endeavors are being reported in subjects ranging from civil defense to various aspects of conservation including air and water pollution. Audiences for such classes are now much more varied than the farmer groups who used to be the target for virtually all of the adult education in agriculture.

**Young Farmer Education**

This aspect of agricultural education also has its early origins, and has been receiving intensified interest in recent years. While its distinction from adult farmer education has never been completely clear cut, it is apparent that the young farmer program has had as its central purpose providing educational assistance to those who are in the process of becoming established in farming.

Renewed emphasis is in part the result of a national training institute held in Virginia (Rodgers 1968). The institute attracted many of the top names in young farmer education from state departments of education, colleges, and local schools. The report of the conference gives a comprehensive review of young farmer education, and it would serve as an excellent guide for planning and conducting programs. The following conclusions taken from the report are of interest.

1. The need for a program of continuing education for young farmers is greater than ever today.
2. Recruitment of young men leaving high school and/or entering agricultural occupations is essential to program growth and enhances the economic and social development of those being recruited.
3. A functioning organizational structure greatly enhances the value of educational programs for young farmers.
4. One of the greatest deterrents to program development in young farmer education is the shortage of well-prepared teaching personnel.
5. There is a need for more cooperation among states on the preparation of educational materials to minimize duplication of effort.
6. Program effectiveness can be greatly improved through cooperation with other agricultural and community agencies interested in young farmer education.
7. Additional research is needed to gain knowledge concerning critical factors involved in young farmer education.
8. Well-designed pilot programs are badly needed to test new "systems" approaches and new technological devices employed in young farmer education.
9. Attention should be given to developing more realistic approaches to evaluating the effectiveness of young farmer educational programs.

**Agricultural Education For the Disadvantaged**

*Youth.* Provisions of the Vocational Education Act of 1963 have given impetus to the development of a variety of new programs in agricultural education to meet needs of disadvantaged youth. The usual definition of the

term has included all youth who, for whatever reason, were unable to progress satisfactorily in regular vocational education programs. Hamilton (1967), studying these youth in nonmetropolitan high schools in Ohio found that the greatest numbers were: (1) intellectually, (2) educationally, (3) economically, and (4) socially disadvantaged with relatively few considered to be physically or ethnically handicapped. He estimated that one of every seven ninth graders in nonmetropolitan schools had special educational needs.

As a result of his study, Hamilton suggested the following guidelines for developing and conducting vocational agriculture programs for youth with special needs.

1. Identify the potential students early—before they enter high school.
2. Provide vocational guidance and counselling in the junior high school years to assist youth with special needs in making realistic educational and occupational choices.
3. The vocational program should be designed especially for the type of students to be enrolled.
4. Direct the program toward preparation for existing agricultural occupations which are realistic in light of the student's potential.
5. Gear academic courses to the interest and ability level of the student enrolled.
6. Incorporate work for wages as an integral part of the vocational agriculture program.
7. Employ teachers who have special training or interest and ability to work with youth with special needs.
8. Develop special teaching materials for use in vocational agriculture classes for youth with special needs.

Reports from across the nation indicate that many programs have been developed which are more or less consistent with the guidelines listed above. Such programs have prepared youth for entry level jobs in greenhouses, nurseries and in various other agricultural occupations requiring relatively low intellectual activity. Many of the programs have been successful remedial ventures wherein some of the students respond to the special treatments and begin to make normal progress in school. Typically, such programs include courses in English and other academic subjects which are especially designed to meet needs of these youth.

Although little formal evaluation has been reported, comments of teachers and others associated with the endeavors indicated that interest in school increases and that on-job experiences have been satisfactory for many of the students. Walker (1968), reporting on such a program developed at Warsaw, Illinois, writes:

> Their attendance record is exceptional which indicates they want to come to school. They enjoy the program in which they are actively engaged. They understand the reason for performing each activity, and they work at their highest level of capability. Each student participates and feels that he is making a worthwhile contribution. He

wants to cooperate. And third, he enjoys school. He likes his new teachers because they like him. He readily accepts and responds to the attention showered upon him.

These comments of a qualified, professional observer indicate that programs for disadvantaged youth can produce desirable outcomes.

Hamilton (1967) found that disadvantaged ninth graders differed from their peers in the following respects:

1. nearly a year older,
2. from larger families,
3. parents had completed fewer years of school,
4. parents level of occupation was lower,
5. more likely to be living with only one parent,
6. the head of their household was frequently not working,
7. occupational and educational aspirations were much lower,
8. reading level was two grades lower,
9. IQ was lower,
10. grades averaged one grade lower,
11. absent from school twice as much,
12. participated in fewer school activities,
13. usually enrolled in general or vocational curriculums.

These characteristics are generally similar to those found by sociologists, psychologists and investigators from other fields of education studying dropout students. The list should be useful for selecting youth to be enrolled in special programs for the disadvantaged.

*Adult.* A clear cut definition of disadvantaged adults with respect to agricultural education has not been established. Since these persons are not normally in school and since agricultural education programs for adults have objectives even more diverse than objectives for secondary programs, it is more difficult to apply the standard—inability to make satisfactory progress in regular vocational programs—in classifying adults as disadvantaged. Even so, a substantial effort is being made to provide agricultural education to adults who clearly have very special needs. Much of the effort has centered around the small farmer left behind by the technical revolution in agriculture; in other instances displaced farm workers have been the target group. Successful results have been achieved in programs conducted by regular vocational agriculture teachers, special teachers employed by secondary schools, and post-high school area centers. Many of the programs have been operated under auspices of the Manpower Development and Training Act (MDTA).

Gough and Rowe (1968) report a successful effort of this sort in the Somerset, Kentucky area. The MDTA project was conducted with the cooperation of vocational agriculture, county extension, Soil Conservation Service, and Farmers Home Administration workers. Selection of trainees was based on proverty, and the typical trainee was earning less than $1200 per year and had a sixth grade education. Courses were offered to train

peach growers, vegetable producers, greenhouse growers, and small fruits producers. Typically, trainees were given 33 hours of instruction both in the classroom and on the trainees' farms.

According to the report of Gough and Rowe, remarkable gains in net income were achieved as a result of the program. For trainees in one of the courses, net income increased from an average of $618 before the course to $2200 by the end of the second year following the course. Some trainees, of course, gained substantially more than others.

Educational programs in agriculture have changed considerably in recent years. In-school offerings have shifted from a farming orientation toward off-farm agricultural occupations. Experience with pilot programs indicates that a number of approaches may be successful as preparation for off-farm occupations. Directed work experience is clearly advantageous. Integration of course content from the several vocational areas into a combined program has shown some promise. And, the in-school program is being extended to include agricultural education programs at the 13th and 14th grade levels.

The economic value of adult farmer education has been found to be large in relation to its costs. Several states have recognized this fact and have extensive programs of farm management instruction. Pilot efforts have also indicated adult agricultural education for off-farm workers has good potential value.

Agricultural education for disadvantaged students has received considerable attention. Means of identifying such persons has been found and some approaches to effective education of this group have been used successfully. However, much more needs to be done in methodology, preparation of teachers and instructional materials for improving the effectiveness of educational programs for disadvantaged students.

The need for diverse educational programs is evident. Working with the varied groups in agricultural education has always presented a challenge. However, the task has become much more complex with attention to the important educational needs of workers employed in off-farm agriculture. These agri-business employees comprise a significant segment of the entire work force of our nation. The demands of these citizens, coupled with the technological advances in agricultural industry, necessitate new and revised programs in agricultural education.

## FACILITIES AND EQUIPMENT

There has been continued interest among researchers in learning more about facility requirements for programs of vocational agriculture. Much of this has involved gathering data concerning existing facilities with a view toward making judgments about what should be recommended for conducting successful programs of vocational agriculture. More recently, interest has focused upon requirements for specialized agricultural programs such as ornamental horticulture and agricultural mechanics.

Workers at Clemson University tabulated information from 27 states across the nation concerning standards for physical facilities which have been established for operating departments of vocational agriculture within the respective states (Coile and Jensen 1968). Another 16 states had reported that no standards were established. In a companion study (McClimon and Jensen 1968) teachers of vocational agriculture in South Carolina were surveyed to determine facilities currently available and the opinions of the teachers as to needs for conducting an effective instructional program. The tabulations from the two studies were then reviewed by a state committee and rather elaborate recommendations were made for facilities and equipment for various types of vocational agriculture programs. There is evidence that somewhat similar activity has been undertaken in a number of states, often on an informal basis, to establish standards or recommendations for departmental facilities.

Studies in Oregon (Atwood 1967) and in Texas (Dunlap 1966) indicated substantial use of school farms in the instructional program in agriculture. Of 85 questionnaires returned in the Oregon study (100 had been mailed) from selected teachers of vocational agriculture in Oregon, Washington and California, 50 indicated school-owned land was available and 38 indicated it was being used in the curriculum. It was the Panhandle-South Plains area of Texas that was canvassed by Dunlap. Eighty-four of the 92 teachers in the area responded and 48 of these reported the use of school farms.

Fretts (1968), working at Pennsylvania State University, asked 32 horticultural businessmen and 15 teachers of ornamental horticulture to rate the importance of various items of equipment for both general and vocational programs of ornamental horticulture. The teachers and businessmen generally agreed on needs and that schools offering either type of instruction need to be fully equipped with modern facilities and equipment to provide satisfactory education in ornamental horticulture.

Spengler (1968) studied the agricultural mechanics equipment and facilities being used in vocational agriculture departments in Minnesota. Among his findings was the fact that fewer than 15 percent of the shops provided 150 square feet of free floor space per student in the largest class using the shop, which is the recommendation of the U.S. Office of Education. Another interesting observation was that the degree to which a shop was well equipped seemed to be directly related to the adequacy of the preparation of the instructor in agricultural mechanics. This is further evidence of the requirement for well-prepared teachers if programs are to be operated effectively.

The approach being used by the various states to determine facility standards has been useful. However, the addition of new occupational programs and the ever-changing nature of jobs themselves is making this a rather cumbersome undertaking. It would seem appropriate, therefore, for a regional and/or national effort to be exerted to establish standards for facilities needed to provide effective educational programs in the various occupations. It would be essential, of course, that the recommendations be continuously updated. Such an effort would greatly simplify the

state and local task of providing adequate facilities for the programs, and the over-all efficiency of accomplishing the task would improve substantially.

Regional facility-planning centers are emerging across the nation. If agricultural education were to develop a regional or national facilities project, these centers would provide a demonstration outlet for disseminating innovations.

## STUDENT PERSONNEL SERVICES

Researchers are showing renewed interest in student clientele for programs of vocational agriculture. Most of this interest has centered upon high school students with concern for a better understanding of them and the processes they undergo in deciding about future educational and career goals.

Recent work has reinforced some conclusions of former studies. For example, it seems clear that students of vocational agriculture on an average score lower on mental ability tests, especially in verbal and math skills, than do their peers in school. Horner and others (1967a) in reviewing studies related to decision-making of rural youth found considerable evidence of this. Evidence of lower academic ability has also been found by Shill (1968) in Mississippi and Robinson (1967) in Pennsylvania, among others.

Shill (1968) found that vocational agriculture students tended to make lower grades and thus rank lower in their classes than other students. Norris (1968) found the lower ability to be common to vocational students in general in an area vocational-technical center in Oklahoma. This same relationship has been shown repeatedly in students who go on to attend a college of agriculture. Thompson and Gordon (1964) indicate students of agriculture at the University of California at Davis score lower in verbal and math skills than other students at the University.

A second factor associated with farm youth and vocational agriculture students is that the attitudes of their parents do not encourage them to aspire to educational or occupational levels as high as those of their peers. This relationship of parental attitude to level of student aspiration has been shown to be important in a number of investigations, e.g. Shill (1968) and Robinson (1967). In general, data from numerous investigations support the contention that educational level of the mother is more important in determining student educational aspirations whereas the father's occupation seems to relate to occupational aspiration. And, the studies show that both farm and vocational agriculture youth tend to have lower levels of educational and occupational aspiration.

Students of vocational agriculture seem to have more realistic educational and occupational goals than do students in general. It is not clear whether this is because of assistance in career and educational choices associated with the vocational agriculture classes or whether it is simply a

function of the tendency to have lower aspirations. Regardless of the reason, the proportion of farm youth who achieve their previously indicated goals is much higher than for the general population. For example, Bjoraker and Sledge (1968) found that, while twice as many nonfarm youth had planned to attend college, the number earning bachelors degrees was approximately the same for both groups, farm and nonfarm.

Another characteristic associated with rural youth in general is the strong interest in studying about agriculture. This is evidenced by the actual enrollments in vocational agriculture and by numerous efforts to determine the need for additional, more specialized offerings in agriculture. Altman and Smith (1968) reported that 38 percent of all eighth grade boys in one South Carolina county indicated an interest in studying about plants and 61 percent were interested in enrolling in a horticultural course. Noakes (1965) found some differences in the agricultural interests of boys and girls in New York State, but large numbers of both groups indicated an interest in studying some aspect of agriculture.

Rural youth, other than those going to college, indicate little awareness of having received vocational or educational guidance. This seems to be even more true for youth from low socioeconomic families. The more comprehensive studies of Bjoraker and Sledge (1968) and the review by Horner and others (1967) are concerned with data collected earlier when vocational guidance was relatively unknown in rural schools. However, the degree to which vocational guidance has had an impact on decisions of rural youth has not increased significantly according to studies of recently graduated high school youth. For example, Dobbins (1968) found that immediate families and friends had the greatest influence on occupational and educational aspirations of seniors in selected schools in Louisiana. Similar findings are reported by Eaddy (1968) for the same state. None of the studies reviewed report counseling and providing occupational information to have been perceived of great importance to students in making their choices.

Hamilton (1967) constructed a scale to measure interests in five agricultural occupation areas. He was able to distinguish interest patterns of individuals in agricultural production, ornamental horticulture and agricultural mechanics successfully. The effort was only moderately successful for workers in conservation. Interest patterns for individuals in agricultural business did not lend themselves to successful differentiation from the other groups using his scale.

One student personnel service sorely needed in agricultural education is a satisfactory means of selecting students for the various occupational programs being offered. Hamilton's project cited in the preceding paragraph is a good beginning. However, an aggressive attack on this problem could result in development of better instruments to assess interests, abilities, aptitudes and other personal characteristics of students and to determine relationships between such characteristics and probable success in various agricultural occupations. Work of this nature would surely enhance the chances for proper placement of students into occupational programs.

## EVALUATION

### Success in College

One of the recognized criteria for evaluating secondary educational programs is the degree of success in college experienced by participants in the programs. A number of studies dealing with achievement of former vocational agriculture students enrolled in college curricula have been reported over the years. Most of the studies tend to reinforce the findings of other studies.

McClelland's (1965) summary of 27 studies in achievement of vocational agriculture graduates was rather comprehensive and concluded:

1. Former students of vocational agriculture do as well as or better than those without vocational agriculture in agricultural colleges.
2. Students who had vocational agriculture did better in some beginning college of agriculture courses and botany.
3. Students who enroll in vocational agriculture and plan to attend college should also enroll in preparatory mathematics and science courses.
4. Vocational agriculture graduates seemed to participate more in leadership activities in college and rural communities than nonvocational agriculture graduates.

Thacker (1967) investigated pre-college experience as preparation for success in college of agriculture and failed to identify any single variable that would serve as a predictor of freshman grades. Chambers (1965) compared grade point means and SCAT scores of students who did and did not study vocational agriculture in high school. He determined that students with two or more units of vocational agriculture had slightly higher grade point means and mean SCAT scores than those with no units.

Blanton (1968) investigated the influence of selected variables upon the recruitment and subsequent success of students enrolled in agricultural education. Findings of the study indicated rank in high school class to be a valuable predictor of success in college.

McClay (1967) collected information by questionnaire and from university transcripts in order to relate precollege education and experience to college performance and tenure in teaching. It was concluded that success of students in high school is related to success in college.

Cross (1967) investigated the scholastic achievement of vocational agriculture students enrolled at Colorado State University. His findings showed no significant difference in cumulative point-hour ratios between those with and without vocational agriculture in high school. However, students with vocational agriculture were more persistent in each of the five colleges. Fifty-eight percent of the students with vocational agriculture were graduated or still in school after 12 quarters of enrollment as contrasted with 46 percent of those without vocational agriculture. Boyer (1965) found that enrollment in vocational agriculture had no adverse influence on high school achievement. Giffin (1967) supported the findings of the other studies.

**Occupational Status of Former Enrollees in Vocational Agriculture**

The occupational status of former enrollees in vocational agriculture is another measure by which the program has been appraised. Johnsen (1965) investigated the employment status of former high school students of vocational agriculture in Minnesota. Findings indicated that over 99 percent of the former students were employed and that the rate of employment increased proportionately with additional years of vocational agriculture completed. Over 55 percent of the former students in the civilian labor force were engaged in farming or in agriculturally related occupations. An additional 18 percent of the former students were employed in mechanical occupations related to the training they received in vocational agriculture. Magisos (1966) determined from his study of former vocational agriculture students in the State of Washington that 99.6 percent were employed. Of all former students available for employment slightly more than 26 percent were engaged in farming and off-farm agricultural occupations while about 60 percent were in nonagricultural occupations. In a similar study conducted by the New York State Education Department, findings indicated nearly three-fourths of the agricultural graduates were employed in the occupation for which trained or a closely related occupation. It was further determined that approximately 98 percent of these former students were employed.

Bender's (1964 and 1965) investigations of the occupations of Ohio's vocational agriculture graduates disclosed that approximately 60 percent of the graduates were engaged in farming and off-farm agricultural occupations with approximately one percent of the graduates unemployed. Borcher's (1967) study of high school graduates in Nebraska indicated that enrollment in vocational agriculture was found to be positively correlated with job satisfaction score. Galbraith (1966) found in his follow-up study of high school graduates that a higher percentage of the agricultural graduates were employed full-time or self-employed. He also found a larger percentage of agricultural graduates had pursued post-high school education other than in a four-year college.

Holmquist's (1967) investigation of future farmers who earned the State Farmer Degree in Idaho disclosed that approximately one-half of the State Farmers had chosen an agricultural career and that approximately 62 percent of those not farming had entered professional occupations. Corman's (1965) study of the employment status of male high school graduates disclosed that graduates of agricultural curriculums in Fulton County, Pennsylvania exceeded nonagricultural graduates in rate of employment, percentage of full-time employment, tenure in present positions and in percentage of jobs requiring highly skilled workers with opportunity for advancement. Deunk (1968) determined from his study of the occupational status of all farm-reared male high school graduates from five high schools that over half of the graduates were employed in occupations having a relatively high prestige value and that income and need for agricultural knowledge were highly correlated. Also, one-fourth of the graduates who enrolled in post-high school institutions had majored in agricultural curriculums, and one-third of the group in the income bracket of $7,001 and above were

engaged in farming. Skidmore (1967) found that 97 percent of the respondents to his questionnaire had favorable comments concerning their experiences in vocational agriculture and the Future Farmers of America.

**Success in Farm and Nonfarm Occupations**

Kahler's (1967) investigation of factors related to the occupations of Nebraska farm male high school graduates revealed significant relationships between the agricultural classification of occupations of the graduates and semesters of vocational agriculture, value of vocational agriculture, extent of migration, size of home farm, occupational income of graduates, need for knowledge of agriculture, and the economic area in which the graduate resided. In attempting to determine the influence of the size of the high school on occupational factors, Ward (1967) determined the highest percentage of graduates who entered farming in Nebraska had attended Class A schools while the lowest percentage had attended Class C schools. More of the graduates from Class C and D schools entered nonagricultural occupations than graduates from Class A and B schools. Also, graduates from the larger high schools had enrolled in more semesters of vocational agriculture than graduates attending smaller high schools.

Piper (1968) investigated young men with vocational agriculture training who did not become established in farming. He determined that approximately 80 percent had pursued some post-high school education. Reasons given for not entering farming included desire for further education after high school, preference of an occupation other than farming, uncertain income from farming, inability to secure capital, family financial obligation, no land available and lack of interest in agriculture.

One approach to evaluating vocational agricultural programs has been accomplished through follow-up studies of graduates from the program to determine their success in farm and nonfarm occupations. Parker (1967) investigated the farm income of full-time farm operators in northeast Kansas. His findings indicated the vocational agriculture group exceeded the nonvocational agriculture group in gross income from livestock, total gross income, operator's return for labor and management, and annual increase in net worth. Kiger's (1965) follow-up study of high school graduates determined that 84 percent of the respondents indicated the school had succeeded in providing them with an adequate educational background. Persons (1966) studied the farmer and his educational investment and found that adult classes attended were significantly related to both gross income and gain in net worth, thus indicating the importance of continuing education to farm success.

Several studies have been conducted to determine the effect of certain characteristics and/or factors on occupations, tenure, success, and location. Bruce (1967) found that personality traits of ascendancy, responsibility, cautiousness, original thinking, and personal relations have a positive relationship to the rank of success given for machinery sales and service employees. Of the characteristics related to migrant status studied by Noland (1968), those found significant included residence of origin, father's occupation, marital status, military service, first occupation, and current occupation.

**Assessment of the Achievement of Enrollees**

In attempting to assess the achievement of enrollees in vocational agriculture a number of approaches were followed. Harrison (1968) investigated the value of experiences in vocational agricultural mechanics to students pursuing selected curriculums at Oklahoma State Tech. Data indicated that both students and instructors were convinced that most skills taught in agricultural mechanics could be of value to students pursuing certain mechanics courses at Oklahoma State Tech.

Somers (1968) conducted a follow-up study of male graduates of high schools offering vocational agriculture and determined that those belonging to various organizations while attending high school were benefited in later life in their jobs and their relations with other people and in civic affairs. Membership in organizations while in high school was considered an important part of an individual's education.

Wood (1967) investigated post-high school educational programs in agriculture and determined through information gathered from college supervisors and employers that graduates of such programs rated high in integrity, dependability, cooperation, courtesy, personal appearance, aptitude, and emotional stability. The same graduates were rated average in initiative, judgement and leadership. Approximately 95 percent were indicated to be acceptable permanent employees and nearly 90 percent were employed in agriculture. Over one-half had remained at their on-the-job training positions.

Moller (1968) concluded from his study that Wyoming should expand the adult educational program in agriculture and center the program around systematic instruction utilizing a recordkeeping analysis system.

**Evaluating Instruments**

During the past few years, a great deal of interest has been shown in developing evaluative instruments. A number of attempts have been made to improve on existing instruments; therefore, a few recent efforts in this direction will be mentioned. Woodin (1966) prepared guidelines for the development of instruments for evaluation in vocational agriculture. The publication was the result of a national seminar on evaluation and program planning in agricultural education. The Pennsylvania State Department of Public Instruction (1965) developed an instrument for evaluating a department of vocational agriculture. It was designed to identify strengths and weaknesses and to lead to certain recommendations.

Girouard (1967) used an opinionaire to determine the cirteria and indicators to include in an evaluation instrument. The instrument is divided into 11 sections. Rosenfeld (1967) attempted to develop an evaluation instrument for a joint vocational school. His approach was to develop a set of objectives which accurately reflected the task the school would like to attempt and the outcomes needed in order to view the school as successful. This approach to evaluating educational programs in terms of behavioral outcomes merits attention.

Several specialized instruments for evaluating certain personnel or parts of programs have been attempted. Linson (1964a) developed an instrument for use in self-evaluation of state staff supervisory programs in agricultural education. Lord (1967) developed an instrument for appraising written units of instruction. Kerwood (1967) developed an instrument to guide the self-initiated evaluation of a state program of vocational teacher education. He developed criteria and indicators and attempted to validate the instrument.

There appears to be an adequate background of research indicating the relative success of participants in high school agricultural education programs who enroll for post-secondary education. Also, there seems to be abundant evidence of the favorable employment rate of former enrollees in vocational agriculture. Many investigations reveal these former students fare well in terms of percentage employed in occupations of relatively high prestige, income, opportunity for advancement, and tenure in present positions.

Administrators continue to be concerned about approaches to evaluating educational programs. Most of the previous efforts have been highly oriented toward public relations, but of questionable value in determining how well educational programs were meeting objectives. Hence, the need for continued effort in this area is great.

## CONCLUSIONS AND RECOMMENDATIONS

The increased rate of research in agricultural education is encouraging. A sounder philosophy based on carefully collected findings is possible today as compared with only a few years ago. In general, the level of sophistication of research is improving, although only a few of the studies indicate development of a sound theoretical framework.

The expanded productivity of professional researchers is noteworthy despite the fact that a majority of the effort is still undertaken by graduate students. It is from experienced professionals that we can hope for well-designed, long-range projects that will provide answers to the more complex agricultural education problems. Several important examples of such projects are cited in the foregoing review and their potential for program development is great.

Development of pilot programs and demonstration centers is also encouraging. A chronic cirticism has been that well-established research findings are slow to be implemented in educational programs, and although the problem is still apparent, the climate for educational change is vastly improved. Administrators and teachers are much more aware of the need for program modifications than ever before.

From competency studies we have learned that human relations skills, desirable personality traits, and the ability to use English and mathematics usually become the limiting factor in occupational success rather than technical skills. Opinions of school administrators and other groups reinforce the need for agricultural education sharing in promoting the general educa-

tional development of students. The implication seems clear that units in personal and career development should be strengthened in vocational agriculture classes and that the FFA should continue as a viable organization for fostering improved leadership and citizenship and development of human relations skills.

Program changes are apparent. There has been a considerable shift from production agriculture to programs for off-farm agricultural occupations. Special efforts are being made for disadvantaged students. And, the work in Minnesota indicating great economic returns to adult farm management education should encourage expansion of this type activity.

The current concern for education of disadvantaged students presents many research opportunities. Better instructional materials will be required. How to prepare teachers so they will be most effective in educating disadvantaged is not apparent today. Nor are the most effective methods for educating this group known.

Means need to be found for increasing the impact of vocational guidance services upon students. The system of career choice by individual students needs to be somewhat more formalized with improved tools to help them consider abilities, aptitudes, interests and job characteristics and requirements to make more realistic educational and occupational choices. Researchers should contribute much to this effort.

The extensive research on off-farm occupations has not yet produced the information needed to clarify trends useful for providing specialized courses and for guidance information. Continued local effort will be needed. In addition, means need to be found for identifying agricultural employment in data presented by the Census and the U.S. Employment Service.

Standards for facilities and equipment required for effective instruction in various types of agricultural education programs is another area which lends itself to regional or national attack by researchers.

In teacher education there are many problems claiming attention. However, there seem to be two facets of this program in which desirable modification can produce significant impact. Student teaching appears to have the greatest influence during the preservice education of teachers; whereas, in-service education is essential to changing classroom practices. Also, adoption of new technological devices and curriculum materials will necessitate appropriate in-service education.

Research in administration and supervision has been valuable in defining role concepts as held by various groups. However, there has been little done in determining procedures for effectively influencing the administrative process. Additional research designed to furnish information in this important area could have great importance.

There is a renewed interest in program evaluation at all levels. Administrators are not satisfied to accept the evaluative procedures employed over the years. There is great interest in cost-benefit analysis; however, this entails comparatively expensive research. Hence, the demands imposed by legislation through advisory councils and others must be met by research effort.

To increase efficiency in the research effort in agricultural education it seems imperative that increased coordination exist among professional researchers. The number of investigators is still small when compared with the need and it seems senseless for each to go his independent way. Coordination and articulation should result in a majority of the research activity being directed at those problems having the greatest significance to the agricultural education program.

As emphasized in various sections of this review, a most significant problem area is that of developing a new philosophical basis for agricultural education. Pressures from groups outside agricultural education are causing confusion which may lead to irreparable damage to the program. Sound research techniques can and must be found to help clear the way to a philosophy which will help the profession make its utmost contribution to society.

Other areas of opportunity for coordination have been mentioned throughout the Review. Surely it is time for a national curriculum development effort with appropriate use of the behaviorial objective concept. The oft-stated notion that curriculum materials, to be effective, must be prepared by the classroom teacher is surely beyond intelligent belief today. With so much to teach and so many aids and means available, efficient teaching demands that the classroom teacher select from ready to use teaching/learning packages to meet needs of individual students.

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